

$f_1(1420)$ $I^G(J^{PC}) = 0^+(1^{++})$ See the minireview under $\eta(1405)$. **$f_1(1420)$ MASS**

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
1426.3 ± 0.9 OUR AVERAGE				Error includes scale factor of 1.1.
1426 ± 6	711	ABDALLAH 03H	DLPH	$91.2 e^+ e^- \rightarrow K_S^0 K^\pm \pi^\mp + X$
1420 ± 14	3651	NICHITIU 02	OBLX	
1428 ± 4 ± 2	20k	ADAMS 01B	B852	$18 \text{ GeV } \pi^- p \rightarrow K^+ K^- \pi^0 n$
1426 ± 1		BARBERIS 97C	OMEG	$450 pp \rightarrow pp K_S^0 K^\pm \pi^\mp$
1425 ± 8		BERTIN 97	OBLX	$0.0 \bar{p}p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
1435 ± 9		PROKOSHKIN 97B	GAM4	$100 \pi^- p \rightarrow \eta \pi^0 \pi^0 n$
1430 ± 4		¹ ARMSTRONG 92E	OMEG	$85,300 \pi^+ p, pp \rightarrow \pi^+ p, pp(K\bar{K}\pi)$
1462 ± 20		² AUGUSTIN 92	DM2	$J/\psi \rightarrow \gamma K\bar{K}\pi$
1443 ± 7 ± 3	1100	BAI 90C	MRK3	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
1425 ± 10	17	BEHREND 89	CELL	$\gamma\gamma \rightarrow K_S^0 K^\pm \pi^\mp$
1442 ± 5 ± 10	111	BECKER 87	MRK3	$e^+ e^-, \omega K\bar{K}\pi$
1423 ± 4		GIDAL 87B	MRK2	$e^+ e^- \rightarrow e^+ e^- K\bar{K}\pi$
1417 ± 13	13	AIHARA 86C	TPC	$e^+ e^- \rightarrow e^+ e^- K\bar{K}\pi$
1422 ± 3		CHAUVAT 84	SPEC	ISR 31.5 pp
1440 ± 10		³ BROMBERG 80	SPEC	$100 \pi^- p \rightarrow K\bar{K}\pi X$
1426 ± 6	221	DIONISI 80	HBC	$4 \pi^- p \rightarrow K\bar{K}\pi n$
1420 ± 20		DAHL 67	HBC	$1.6\text{--}4.2 \pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1430.8 ± 0.9		⁴ SOSA 99	SPEC	$pp \rightarrow p_{\text{slow}} (K_S^0 K^+ \pi^-) p_{\text{fast}}$
1433.4 ± 0.8		⁴ SOSA 99	SPEC	$pp \rightarrow p_{\text{slow}} (K_S^0 K^- \pi^+) p_{\text{fast}}$
1429 ± 3	389	ARMSTRONG 89	OMEG	$300 pp \rightarrow K\bar{K}\pi pp$
1425 ± 2	1520	ARMSTRONG 84	OMEG	$85 \pi^+ p, pp \rightarrow (\pi^+, p)(K\bar{K}\pi)p$
~ 1420		BITYUKOV 84	SPEC	$32 K^- p \rightarrow K^+ K^- \pi^0 Y$

¹ This result supersedes ARMSTRONG 84, ARMSTRONG 89.² From fit to the $K^*(892)K 1^{++}$ partial wave.³ Mass error increased to account for $a_0(980)$ mass cut uncertainties.⁴ No systematic error given.

$f_1(1420)$ WIDTH

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
54.9 ± 2.6 OUR AVERAGE				
51 \pm 14	711	ABDALLAH 03H	DLPH	$91.2 e^+ e^- \rightarrow K_S^0 K^\pm \pi^\mp + X$
61 \pm 8	3651	NICHITIU 02	OBLX	
38 \pm 9 \pm 6	20k	ADAMS 01B	B852	$18 \text{ GeV } \pi^- p \rightarrow K^+ K^- \pi^0 n$
58 \pm 4		BARBERIS 97C	OMEG	$450 pp \rightarrow pp K_S^0 K^\pm \pi^\mp$
45 \pm 10		BERTIN 97	OBLX	$0.0 \bar{p}p \rightarrow K^\pm (K^0) \pi^\mp \pi^+ \pi^-$
90 \pm 25		PROKOSHKIN 97B	GAM4	$100 \pi^- p \rightarrow \eta \pi^0 \pi^0 n$
58 \pm 10		5 ARMSTRONG 92E	OMEG	$85,300 \pi^+ p, pp \rightarrow \pi^+ p, pp (K\bar{K}\pi)$
129 \pm 41		6 AUGUSTIN 92	DM2	$J/\psi \rightarrow \gamma K\bar{K}\pi$
68 $^{+29}_{-18}$ $^{+8}_{-9}$	1100	BAI 90C	MRK3	$J/\psi \rightarrow \gamma K_S^0 K^\pm \pi^\mp$
42 \pm 22	17	BEHREND 89	CELL	$\gamma\gamma \rightarrow K_S^0 K^\pm \pi^\mp$
40 $^{+17}_{-13}$ \pm 5	111	BECKER 87	MRK3	$e^+ e^- \rightarrow \omega K\bar{K}\pi$
35 $^{+47}_{-20}$	13	AIHARA 86C	TPC	$e^+ e^- \rightarrow e^+ e^- K\bar{K}\pi$
47 \pm 10		CHAUVAT 84	SPEC	ISR 31.5 pp
62 \pm 14		BROMBERG 80	SPEC	$100 \pi^- p \rightarrow K\bar{K}\pi X$
40 \pm 15	221	DIONISI 80	HBC	$4 \pi^- p \rightarrow K\bar{K}\pi n$
60 \pm 20		DAHL 67	HBC	$1.6\text{--}4.2 \pi^- p$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
68.7 \pm 2.9		7 SOSA 99	SPEC	$pp \rightarrow p_{\text{slow}} (K_S^0 K^+ \pi^-) p_{\text{fast}}$
58.8 \pm 3.3		7 SOSA 99	SPEC	$pp \rightarrow p_{\text{slow}} (K_S^0 K^- \pi^+) p_{\text{fast}}$
58 \pm 8	389	ARMSTRONG 89	OMEG	$300 pp \rightarrow K\bar{K}\pi pp$
62 \pm 5	1520	ARMSTRONG 84	OMEG	$85 \pi^+ p, pp \rightarrow (\pi^+, p) (K\bar{K}\pi) p$
\sim 50		BITYUKOV 84	SPEC	$32 K^- p \rightarrow K^+ K^- \pi^0 Y$

⁵ This result supersedes ARMSTRONG 84, ARMSTRONG 89.

⁶ From fit to the $K^*(892) K^- \pi^+$ partial wave.

⁷ No systematic error given.

 $f_1(1420)$ DECAY MODES

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 K\bar{K}\pi$	dominant
$\Gamma_2 K\bar{K}^*(892) + \text{c.c.}$	dominant
$\Gamma_3 \eta \pi \pi$	possibly seen
$\Gamma_4 a_0(980)\pi$	

Γ_5	$\pi\pi\rho$	
Γ_6	4π	
Γ_7	$\rho^0\gamma$	
Γ_8	$\phi\gamma$	seen

$f_1(1420)\Gamma(i)\Gamma(\gamma\gamma)/\Gamma(\text{total})$

$\Gamma(K\bar{K}\pi) \times \Gamma(\gamma\gamma^*)/\Gamma_{\text{total}}$

VALUE (keV)	CL%	DOCUMENT ID	TECN	COMMENT
1.7±0.4 OUR AVERAGE				
3.0±0.9±0.7	8, ⁹	BEHREND	89	CELL $e^+e^- \rightarrow e^+e^- K_S^0 K\pi$
2.3 ^{+1.0} _{-0.9} ±0.8		HILL	89	JADE $e^+e^- \rightarrow e^+e^- K^\pm K_S^0 \pi^\mp$
1.3±0.5±0.3		AIHARA	88B	TPC $e^+e^- \rightarrow e^+e^- K^\pm K_S^0 \pi^\mp$
1.6±0.7±0.3	8, ¹⁰	GIDAL	87B	MRK2 $e^+e^- \rightarrow e^+e^- K\bar{K}\pi$

• • • We do not use the following data for averages, fits, limits, etc. • • •

<8.0	95	JENNI	83	MRK2 $e^+e^- \rightarrow e^+e^- K\bar{K}\pi$
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⁸ Assume a ρ -pole form factor.

⁹ A ϕ - pole form factor gives considerably smaller widths.

¹⁰ Published value divided by 2.

$f_1(1420)$ BRANCHING RATIOS

$\Gamma(K\bar{K}^*(892)+\text{c.c.})/\Gamma(K\bar{K}\pi)$

Γ_2/Γ_1

VALUE	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •			
0.76±0.06	BROMBERG	80	SPEC $100\pi^- p \rightarrow K\bar{K}\pi X$
0.86±0.12	DIONISI	80	HBC $4\pi^- p \rightarrow K\bar{K}\pi n$

$\Gamma(\pi\pi\rho)/\Gamma(K\bar{K}\pi)$

Γ_5/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
• • • We do not use the following data for averages, fits, limits, etc. • • •				
<0.3	95	CORDEN	78	OMEG 12–15 $\pi^- p$
<2.0		DAHL	67	HBC 1.6–4.2 $\pi^- p$

$\Gamma(\eta\pi\pi)/\Gamma(K\bar{K}\pi)$

Γ_3/Γ_1

VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.1	95	ARMSTRONG	91B	OMEG $300 pp \rightarrow pp\eta\pi^+\pi^-$
• • • We do not use the following data for averages, fits, limits, etc. • • •				
1.35±0.75		KOPKE	89	MRK3 $J/\psi \rightarrow \omega\eta\pi\pi(K\bar{K}\pi)$
<0.6	90	GIDAL	87	MRK2 $e^+e^- \rightarrow e^+e^-\eta\pi^+\pi^-$
<0.5	95	CORDEN	78	OMEG 12–15 $\pi^- p$
1.5 ±0.8		DEFOIX	72	HBC 0.7 $\bar{p}p$

$\Gamma(a_0(980)\pi)/\Gamma(\eta\pi\pi)$				Γ_4/Γ_3
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
>0.1	90	PROKOSHKIN 97B	GAM4	$100 \pi^- p \rightarrow \eta\pi^0\pi^0 n$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
not seen in either mode		ANDO	86	SPEC $8 \pi^- p$
not seen in either mode		CORDEN	78	OMEG 12–15 $\pi^- p$
0.4 ± 0.2		DEFOIX	72	HBC $0.7 \bar{p}p \rightarrow 7\pi$
$\Gamma(4\pi)/\Gamma(K\bar{K}^*(892)+\text{c.c.})$				Γ_6/Γ_2
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.90	95	DIONISI	80	HBC $4 \pi^- p$
$\Gamma(K\bar{K}\pi)/[\Gamma(K\bar{K}^*(892)+\text{c.c.}) + \Gamma(a_0(980)\pi)]$				$\Gamma_1/(\Gamma_2+\Gamma_4)$
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
0.65 ± 0.27		¹¹ DIONISI	80	HBC $4 \pi^- p$
¹¹ Calculated using $\Gamma(K\bar{K})/\Gamma(\eta\pi) = 0.24 \pm 0.07$ for $a_0(980)$ fractions.				
$\Gamma(a_0(980)\pi)/\Gamma(K\bar{K}^*(892)+\text{c.c.})$				Γ_4/Γ_2
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$0.04 \pm 0.01 \pm 0.01$		BARBERIS	98C	OMEG $450 pp \rightarrow p_f f_1(1420) p_s$
$\bullet \bullet \bullet$ We do not use the following data for averages, fits, limits, etc. $\bullet \bullet \bullet$				
<0.04	68	ARMSTRONG	84	OMEG $85 \pi^+ p$
$\Gamma(4\pi)/\Gamma(K\bar{K}\pi)$				Γ_6/Γ_1
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.62	95	ARMSTRONG	89G	OMEG $85 \pi p \rightarrow 4\pi X$
$\Gamma(\rho^0\gamma)/\Gamma_{\text{total}}$				Γ_7/Γ
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.08	95	¹² ARMSTRONG	92C	SPEC $300 pp \rightarrow pp\pi^+\pi^-\gamma$
¹² Using the data on the $K\bar{K}\pi$ mode from ARMSTRONG 89.				
$\Gamma(\rho^0\gamma)/\Gamma(K\bar{K}\pi)$				Γ_7/Γ_1
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
<0.02	95	BARBERIS	98C	OMEG $450 pp \rightarrow p_f f_1(1420) p_s$
$\Gamma(\phi\gamma)/\Gamma(K\bar{K}\pi)$				Γ_8/Γ_1
VALUE	CL%	DOCUMENT ID	TECN	COMMENT
$0.003 \pm 0.001 \pm 0.001$		BARBERIS	98C	OMEG $450 pp \rightarrow p_f f_1(1420) p_s$

f₁(1420) REFERENCES

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